STS-100 Flight Readiness Review (FRR) Minutes

The STS-100 FRR convened at 10:30 a.m. on Thursday, April 5, 2001, in the Kennedy Space Center (KSC) Mission Briefing Room. The meeting was chaired by R. Estess, Space Shuttle Program Lead Center Acting Director.

Flight Crew, Ferry Readiness, Range, and DDMS did not have any issues or constraints to flight and did not make formal presentations. Readiness statements submitted were included in the backup package.

The STS-100 FRR presenters were:

Mission Summary - P. Engelauf (NASA/JSC/DA8)
Program Integration - D. Holt (NASA/JSC/MA2)
International Space Station - F. Booker (NASA/JSC/OC), S. Porter (NASA/JSC/OB), S. Walker (NASA/JSC/OB), B. Eliason (NASA/JSC/OB), E. Gholdston (Boeing/Canoga Park/LA-73), S. West (Boeing/JSC/ZC01), C. Dempsey (NASA/JSC/OX), C. Hatfield (NASA/JSC/OM7), B. Marcotte (Canadian Space Agency/Houston), J. Arend (NASA/JSC/OM511), P. Thomas (Boeing/Houston/JHOU-2340), V. Feng (NASA/JSC/OZ211), R. Nygren (NASA/JSC/OZ111)
Payload Processing - T. Corey (NASA/KSC/BD-C)
External Tank - P. Kopfinger (LMSSC/MSFC/4610)
RSRM - S. Graves (Thiokol/Utah/TI-L50)
SRB - R. Elliott (USA/KSC/USK-417)
SSME - D. Adamski (Rocketdyne/Canoga Park/55-AB88)
Vehicle Engineering - D. White (USA/Houston/USH-601M), K. Hinkle (Boeing/Huntington Beach/H021-F225), P. Shack (NASA/JSC/EA42)
EVA - T. Jochim (Hamilton Sundstrand/JSC/XA-HAM), R. Mumford (Hamilton Sundstrand/Windsor Locks-CT/1A-2-Z62)
Shuttle Processing - J. Vevera (USA/KSC/USK-229), C. Connolly (USA/KSC/USK-459), M. Leinbach (NASA/KSC/PH)
Mission Operations - T. Sobchak (NASA/GSFC/451), L. Bourgeois (USA/Houston/USH-402L), M. Heflin (NASA/JSC/DA8)
Space and Life Sciences - D. Williams (NASA/JSC/SA)
SR&QA - M. Erminger (NASA/JSC/MQ)

Mission Summary

Mission 6A in the International Space Station (ISS) assembly sequence will deliver and check out the Space Station Remote Manipulator System (SSRMS), fly the Multi-Purpose Logistics Module (MPLM) for the second time, install express racks in the US Lab, transfer utilization experiments, and deliver on-orbit spares, such as the Direct Current Switching Unit. The possible conflict with the Soyuz launch and associated return vehicle changeout mission was discussed.

Program Integration

Mission requirements call for an 11-day mission with three Extra-Vehicular Activities (EVA's). During deployment, the SSRMS is safe to remain on orbit after EVA 1 and operational after EVA 2.

International Space Station (ISS)

The Soyuz 1S relocation from the Russian FGB nadir to the Service Module aft station prior to 6A was discussed. Status of the ISS water vent plan, intermittent failure of the Carbon Dioxide Removal Assembly, and bit flips occurring in six different Orbital Replacement Units was given. Special Topics included the Plasma Contactor Unit configuration and associated EVA plan, Robotic Work Station operation using Display and Control Unit bypass cables, and the recovery plan for the Beta Gimbal Assembly Latch 2 lock failure. The plan and schedule for repairing broken slats on the Treadmill Vibration Isolation System (TVIS) chassis were presented.

Avionics and Software reviewed progress on the Ku-Band pointing anomaly, the Control Moment Gyroscope 2 spin motor current transient, and a video cross-wiring problem. There is one exception regarding failed qualification testing of the Initial Express Rack 2 Viton Umbilicals.

Payload Processing

Open work and launch delay payload requirements were reviewed. A Certificate of Flight Readiness (CoFR) exception concerning a ground safety review of the Commercial Generic Bioprocessing Apparatus was closed. A second CoFR exception regarding the MPLM Module 2 design baseline along with an incomplete as-designed versus as-built comparison has an estimated completion date of April 5, 2001.

External Tank (ET)

Closure of a significant processing anomaly concerning 175-ton crane grease contamination on the External Tank was reviewed. There was one approved waiver presented: the liquid oxygen tank Thermal Protection System does not meet the launch probability "no-ice" requirement.

Reusable Solid Rocket Motor (RSRM)

No significant discrepancies were detected during the STS-102 motor disassembly. One nonconformance describing factory grit blast hose contamination affecting motor insulation and weather seal bonds resulting in possible unbonds was closed. STS-100 is safe to fly.

Solid Rocket Booster (SRB)

Class I changes since STS-102 are first flight of the C-Band Controller, structural repairs to the left forward skirt S/N 20022 damaged during water impact on STS-37, and the use of environmentally friendly materials along with new ammonium perchlorate feedstock in the Booster Separation Motors.

Space Shuttle Main Engine (SSME)

Major components, ignition margins, predicted performance, and redline margins were presented.

Vehicle Engineering

Degraded Freon Coolant Loop 1 flow due to radiator icing and Orbital Maneuvering System vapor isolation valve failed-closed indication, both In-Flight Anomalies from STS-102 were reviewed. Critical process changes taken against chipped chrome plating on External Tank 2-inch disconnect poppets, Air Half-Coupling specification substitutions, new procedures for cleaning honeycomb cores, and new cleaning verification fluids as part of the Freon replacement effort were presented. Three Orbiter special topics (Power Reactant Supply and Distribution cracked valve seat, castellated nut locking feature discrepancy, and white residue on reinforced carbon-carbon surfaces) were found acceptable for flight.

Extravehicular Activity (EVA)

A Special Topic was presented regarding the phase VI glove damage from the 12-volt heater, which was resolved by the addition of voltage regulators.

Shuttle Processing

Late payload installation and replacement of the #2 Mass Memory Unit were considered planned processing differences while the early hypergolic pressurization due to the L2D thruster leak and late installation of 16mm umbilical cameras were listed as unplanned work. During pad operations, a vibration on the flight deck reported by astronaut support personnel was investigated and eventually closed as an Unexplained Anomaly. An anomalous condition where the Payload Changeout Room door seal contacted the Orbiter payload bay door was still under investigation, but was not a constraint to further processing or launch.

Mission Operations

The Mission Operations Directorate outlined the integrated network activity, mission requirements, facility readiness, flight rules, ascent performance, and significant open work.

Space and Life Sciences

Status was given on the Treadmill Vibration Isolation System repairs with contingency exercise plans, the Interim Resistive Exercise Device, predicted radiation exposure for Increment 2, and contamination of the Russian water system.

Safety, Reliability and Quality Assurance

Significant Assessments have been performed on the Canadarm 2 camera light problem, Plasma Contactor Unit failure modes, 2S Soyuz crew arrival, Orbiter reinforced carbon-carbon contamination, EVA glove heaters, and Confined Detonating Fuse low nitrogen content specification.

Exceptions/Action Items

No exceptions were submitted. There were two action items assigned to ISS for closure at the Prelaunch Mission Management Team meeting concerning the assessment of ISS high pressure oxygen components for possible contamination and results of the beta gimbal assembly latch requirement analysis for 6A docking with or without locked solar arrays.

Mr. Estess polled the principal managers and organizations; all responded ready to support the STS-100 mission.

James D. Halsell, Jr.
Colonel, USAF
Manager, Launch Integration

Enclosure:
Agenda
Action Item Log

STS-100
Flight Readiness Review
April 5, 2001

Agenda

Introduction	Manager, Launch Integration
Mission Summary	Flight Director, Mission Operations
Program Integration	Flight Manager Manager, Space Shuttle KSC Integration Manager, Space Shuttle Systems Integration Manager, Space Shuttle Customer and Flight Integration APM, Program Integration, SFOC
International Space Station	Manager, International Space Station Program
Payload Processing	Director of ISS/Payloads Processing
External Tank	Manager, External Tank Project
RSRM	Manager, Reusable Solid Rocket Motor Project
SRB	Manager, Solid Rocket Booster Project APM, SRB Element, SFOC
SSME	Manager, Space Shuttle Main Engine Project
Vehicle Engineering	Manager, Space Shuttle Vehicle Engineering APM, Orbiter Element, SFOC APM, Flight Software, SFOC APM, FCE/EVA, SFOC
EVA	Manager, EVA Project
Shuttle Processing	Director of Shuttle Processing APM, Ground Operations, SFOC APM, Integrated Logistics, SFOC
Mission Operations	Director, Mission Operations APM, Flight Operations, SFOC
Flight Crew	Director, Flight Crew Operations
Space and Life Sciences	Director, Space and Life Sciences
Ferry Readiness	Ferry Operations Manager
Range	United States Air Force
DDMS	Director, DDMS
SR&QA	Manager, Safety, Reliability and Quality Assurance
Exception/Action Summaries	Manager, Launch Integration
Readiness Poll	Lead Center Director for Space Shuttle and Space Station Programs

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ACTION ITEM LOG

CONTROL NO.	ASSIGNEE(S)	ACTION	C	DUE DATE	CLOSURE DATE
100-FRR-001	INTERNATIONAL SPACE STATION	COMPLETE ASSESSMENT OF ISS HIGH PRESSURE OXYGEN COMPONENTS FOR POSSIBLE CONTAMINATION AND REPORT RESULTS AND RECOVERY PLAN TO PRELAUNCH MISSION MANAGEMENT TEAM (PMMT) REVIEW.		STS-100 PMMT	
100-FRR-002	INTERNATIONAL SPACE STATION	REPORT RESULTS OF BETA GIMBAL ASSEMBLY LATCH REQUIREMENT ANALYSIS AND FINAL RECOMMENDATIONS FOR 6A DOCKING WITH/WITHOUT ARRAYS LOCKED.		STS-100 PMMT	

C - CONSTRAINT TO MILESTONE